

AMENDMENTS TO THE CLAIMS

Claims 1-35 (cancelled).

36. (Currently Amended) ~~A method of using a hydrogen containing gas as a fuel, a component of a fuel or a fuel additive in hydrogen assisted combustion within a compression engine comprising the steps of~~

~~admitting materials for making the hydrogen containing gas to providing a hydrogen generator,~~

~~providing a compression engine~~

~~assessing requirements for hydrogen assisted combustion within the compression engine,~~

~~causing a reaction of materials in the hydrogen generator in the presence of heat to producing the produce a hydrogen containing gas as a gas blend or gas mixture using the hydrocarbon generator in which the gas blend or gas mixture contains comprising by volume 50% or less hydrogen gas together with and at least one other gaseous component by-product of the reaction, including selecting for the gas blend or gas mixture relative amounts of the hydrogen gas and the at least one other gaseous by-product in accordance with the nature of the at least one other gaseous by-product and the requirements for hydrogen assisted combustion within the compression engine,~~

~~reducing the temperature of the gas blend or gas mixture by passing the gas blend or gas mixture through a heat exchanger to form a cooled gas blend or gas mixture,~~

~~introducing the cooled gas blend or gas mixture into the a compression engine as a first fuel component,~~

~~introducing another a second fuel component into the compression engine, said other fuel component being essentially comprising a hydrocarbon or hydrocarbon containing fuel to form the fuel for the compression engine,~~

~~combusting the first and second fuel components within the compression engine to form exhaust gases, and~~

~~passing the exhaust gases through another heat exchanger to extract heat from the exhaust gases to , and~~

~~transferring the heat at least one of the materials being introduced into to aid the reaction in the hydrogen generator for forming producing the hydrogen containing gas wherein the relative amounts of the hydrogen and the at least one other gaseous component of the gas blend or mixture are selected in accordance with the nature of the at least one other gaseous component and the requirements for the hydrogen assisted combustion.~~

37. (Cancelled)

38. (Currently Amended) A method of operating a compression engine using hydrogen assisted combustion comprising ~~the steps of~~

selecting the compression engine

assessing requirements for hydrogen assisted combustion within the selected compression engine,

providing a hydrogen generator,

producing from a reaction of materials in the hydrogen generator in the presence of heat a hydrogen containing gas blend or gas mixture comprising by volume 50% or less hydrogen gas together with and at least one other gaseous by-product of the reaction component in the form of a gas blend or gas mixture, including selecting for the gas blend or gas mixture relative amounts of the hydrogen gas and the at least one other gaseous by-product in accordance with the nature of the at least one other gaseous by-product and the requirements for hydrogen assisted combustion in the selected compression engine,

cooling the gas blend or gas mixture by passing the gas blend or gas mixture through a heat exchanger to form a cooled cooled gas blend or gas mixture,

introducing the cooled gas blend or gas mixture into the compression engine as ~~at least one~~ a first fuel component of fuel for the combustion engine,

introducing ~~another~~ a second fuel component of the fuel into the compression engine, ~~said other component being comprising~~ a hydrocarbon or hydrocarbon containing fuel component for the compression engine,

combusting the first and second fuel components in the combustion engine to form exhaust gas,

passing the exhaust gas through a heat exchanger to extract heat from the exhaust gas to, and

transferring the heat for heating the material from which to aid the reaction in the hydrogen generator producing the gas blend or gas mixture is produced

~~wherein the relative amounts of the hydrogen and the at least one other gaseous component of the gas blend or gas mixture are selected in accordance with the nature of the at least one other gaseous component and the requirements for hydrogen assisted combustion.~~

39. Cancelled)

40. (Currently Amended) A method according to claim 36 or 38 wherein the at least one other gaseous component by-product is selected from the group consisting of: oxygen, nitrogen, water, ethanol, carbon dioxide, carbon monoxide, hydrocarbons, methanol, methane or combinations thereof.

41. (Currently Amended) A method according to claim 36 or 38 in which wherein the reaction within the hydrogen generator reaction produces a hydrocarbon material is produced in the hydrogen generator along with the hydrogen containing gas blend or gas mixture and the at least one other gaseous by-product component or components.

42. (Currently Amended) [a] A method according to claim 41 in which wherein the hydrocarbon material is includes a paraffin or paraffin-like hydrocarbon containing saturated bonds.

43. (Currently Amended) A method according to claim 42 in which wherein the hydrocarbon is comprises a C₁-C₂₀ hydrocarbon or a combination thereof.

44. (Currently Amended) A method according to claim 40 in which the materials for making reacted in the hydrogen generator containing gas is comprises a fuel material including diesel, petrol, gasoline or canola oil.

45. (Currently Amended) A method according to claim 36 or 38 and further including the step of adjusting operating reaction parameters of the hydrogen generator to produce a desired ratio of hydrogen gas to the at least one other by-product component in the gas mixture or blend.

46. (Currently Amended) A method according to claim 45 in which wherein the operating reaction parameters include at least one or more of the following, the (i) composition of the materials introduced to reacted in the hydrogen generator for forming the gas blend or mixture, (ii) the velocities of gases during the reaction of the various components, (iii) the temperature of operation in the reaction in the hydrogen generator, (iv) the pressure of operation of the reaction in the hydrogen generator, the velocity of gas being passed through the generator, (v) the a reaction catalyst being used in the generator, (vi) the amount of magnitude of exposure of the materials in the reactor to the reaction catalyst, (vii) the type of the hydrogen generator used, (viii) the nature and composition of the at least one other by-product component or components produced simultaneously with the hydrogen, (ix) the amount magnitude of cooling of the gas blend or gas

mixture before it is introduced introduction into the compression engine, and (xi) the temperature of the materials in the reaction for producing the gas blend or gas mixture introduced into the reactor.

47. (Currently Amended) A method according to claim 46 in which wherein the pressure hydrogen generator is operated at a pressure of from about 1-5 bar.

48. (Currently Amended) [a] A method according to claim 46 in which wherein the reaction catalyst used in the hydrogen generator is selected from the group consisting of: nickel, platinum, materials containing nickel or platinum or combinations thereof.

49. (Currently Amended) A method according to claim 36 or 38 in which wherein the cooled gas mixture or blend or gas mixture is added directly to the compression engine or indirectly to the compression engine after cooling.

50. (Currently Amended) A method according to claim 49 in which wherein the cooled gas mixture or blend or gas mixture is added to a mixing chamber prior to being introduced into the compression engine.

51. (Currently Amended) [a] A method according to claim 36 or 38 in which wherein the gas blend or gas mixture is added introduced as the first fuel component in combination with one or more other components of the second fuel component for the compression engine.

52. (Currently Amended) A method according to claim 36 or 38 in which wherein the other second fuel component for the compression engine is introduced to the compression engine separately from the first fuel component hydrogen containing gas blend or mixture required for hydrogen assisted combustion.

53. (Currently Amended) A fuel system for a compression engine comprising a hydrogen generator for generating a hydrogen containing gas including by volume 50% or less hydrogen and at least one other by-product component in the form of together comprising a gas blend or mixture at a first temperature, the gas blend or mixture comprising one fuel component for the compression engine, the relative amounts of the hydrogen gas and of the at least one other by-product component the gas blend or mixture being selected in accordance with the nature of the at least one other by-product component and the requirements of hydrogen assisted combustion within the

compression engine, and a heat exchanger for reducing the first temperature of the hydrogen gas blend or mixture from the first temperature to a second temperature by passing the gas blend or mixture through the heat exchanger prior to introducing the gas blend or mixture to the compression engine wherein the gas blend forms one component of the fuel for the engine and wherein the relative amounts of the hydrogen and of the at least one other material of the gas blend or mixture are selected in accordance with the nature of the at least one other material and the requirements of hydrogen assisted combustion within the engine.

54. (Currently Amended) The A system of according to claim 53 in which wherein the hydrogen generator is selected from the group consisting of: an electrolysis apparatus, a fuel cell, a fuel processor, a reformer, a cold fusion apparatus or other apparatus for producing hydrogen gas along with one or more other materials by-product components.

55. (Currently Amended) A method system according to claim 54 in which wherein the hydrogen generator is comprises a reformer operated at a temperature of from 100°C.-1000°C.

56. (Currently Amended) The A system of according to claim 54 in which wherein the fuel cell is selected from the group consisting of: a proton exchange fuel cell, a solid oxide fuel cell, an alkaline fuel cell, a direct methanol fuel cell, a molten carbonate fuel cell, a phosphoric acid fuel cell or a regenerative fuel cell.

57. (Currently Amended) The A system of according to claim 54 in which wherein the hydrogen generator is comprises a reformer in which steam is used to heat a fuel as it passes over a catalyst provided in the hydrogen generator to produce the hydrogen gas together with the at least one other material by-product component to form the gas blend or mixture in the form of a reformatre gas.

58. (Currently Amended) The A system of according to claim 57 in which wherein the fuel and steam are cracked by passage through the hydrogen generator to form the reformatre gas or hydrogen containing gas blend or mixture.

59. (Currently Amended) The A system of according to claim 57 in which wherein the reformer reforms a hydrocarbon fuel including petrol, diesel or gasoline to the reformatre gas or hydrogen containing gas blend or mixture with the aid of steam.

60. (Currently Amended) ~~The A system of according to claim 53 in which wherein the compression engine is comprises a diesel engine.~~

61. (Cancelled)

62. (Cancelled)

63. (Currently Amended) A hydrogen containing gas blend or mix suitable for use as a fuel or fuel additive or one component of a fuel characterised in that the gas blend or mix ~~contains comprises by volume 50% or less hydrogen gas and at least one other component in addition to hydrogen in which the other component that is produced substantially simultaneously with the hydrogen gas by a hydrogen generator in which the relative amounts of the hydrogen gas and the other component is are selected in accordance with the nature of the other component and the requirements of the a selected compression engine for hydrogen assisted combustion within an the selected compression engine to which the gas blend or mix is introduced, the gas blend or mix being subject to cooling prior to combustion within the selected compression engine.~~

64. (Cancelled)

65. (Currently Amended) ~~The A gas blend of according to claim 63 in which wherein the gas blend or mixture mix includes from about 0-25% by volume of carbon monoxide.~~

66. (Currently Amended) ~~The A gas blend of according to claim 63 in which wherein the gas blend or mixture mix includes up to about 5% by volume hydrocarbon material.~~

67. (Currently Amended) ~~The A gas blend of according to claim 63 characterised in that wherein the amount of carbon dioxide contained in the gas mix or blend or mix is up to about 25% by volume.~~

68. (Currently Amended) ~~The A gas blend of according to claim 63 characterized in that wherein the gas blend or mixture mix contains the balance of nitrogen.~~

69 (New) A method according to claim 36 wherein the gas blend or gas mixture comprises by volume about 30% to about 40% of hydrogen gas.

70 (New) A method according to claim 36 wherein the gas blend or gas mixture comprises by volume about 35% to about 38% of hydrogen gas.

71 (New) A method according to claim 38 wherein the gas blend or gas mixture comprises by volume about 30% to about 40% of hydrogen gas.

72 (New) A method according to claim 38 wherein the gas blend or gas mixture comprises by volume about 35% to about 38% of hydrogen gas.

73 (New) A fuel system according to claim 53 wherein the gas blend or mixture comprises by volume about 30% to about 40% of hydrogen gas.

74 (New) A fuel system according to claim 53 wherein the gas blend or mixture comprises by volume about 35% to about 38% of hydrogen gas.

75 (New) A gas blend according to claim 63 wherein the gas blend comprises by volume about 30% to about 40% of hydrogen gas.

76 (New) A gas blend according to claim 63 wherein the gas blend comprises by volume about 35% to about 38% of hydrogen gas.